



## **B.Sc. Medical Lab Technology**

### **4<sup>th</sup> Board of Studies Meeting-Minutes**

Effective from the Academic year  
2024-2025

### **Venue**

Vel Nursing College,  
Velan Nagar, Manjankaranai, Thiruvallur Dt

### **Date & Time**

31.05.2024 & 11.00 am

## MINUTES OF BOARD OF STUDIES

The meeting of the Board of Studies in School of Allied Health Sciences , VISTAS held on **31-05- 2024 at 11am** to implement the **3<sup>rd</sup> to 8<sup>th</sup> semester Curriculum & Syllabus** of the following **Program – B.Sc. MEDICAL LABORATORY TECHNOLOGY** which to be followed from academic year 2024– 2025.

### The following members were present for the BOS meeting

S. No	Name of the Board Member	Designation	Institute / Industry	Role
<b>Internal Members</b>				
1	Mr.K.Kishore Kanna M.Sc(Radiology)	Vice Principal	Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai	Chairperson
2	Mrs.Jebaseeli V M.Sc(Biochemistry)	Assistant Coordinator	Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai	Member
3	Mrs. Bhavani. S M.Sc(Medical Lab Technology)	Assistant Professor	Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai	Member
<b>External Expert Members</b>				
1	Dr.Yamini.B M.Sc.Echocardiography Ph.D. (Cardiology)	Assistant.Professor & Clinical Coordinator	Faculty of Allied Health Sciences, KM Cherian Heart Foundation- Frontier Life Line Hospitals.	Member
2	Dr.M.Radhika M.Sc MLT, PhD(Biochemistry)	Assistant Professor	Sri Ramachandra Institute of Higher Education & Research, Porur,Chennai-116	Member
3	Dr.A Mani, M.Sc,Ph.D (Ophthalmology)	Associate Professor	Chettinad Academy of Research and Education Kelambakkam.	Member
4	Mr.Vyshak M.Sc.(Radiology)	Associate Professor	ACS Medical College & Hospital Velapanchavadi	Member

## AGENDA OF THE MEETING

Item No.	Particulars
<b>BoS / 2024 /MLT / UG / 1.1</b>	Develop curriculum based on Learning Outcome Based Curriculum Framework (LOCF) /Choice Based Credit System(CBCS)
<b>BoS / 2024 /MLT / UG / 1.2</b>	Objective of the Program
<b>BoS / 2024 /MLT / UG / 1.3</b>	Feedback from Stakeholders to ensure that the syllabus of the courses include the state-of-the-art technologies focusing on skill development, employability, and entrepreneurship
<b>BoS / 2024 /MLT / UG / 1.4</b>	To review the UGC policy for CBCS and LOCF curriculum

### Item No:1 BOS / 2024 /MLT / UG / 1.1

---

Develop curriculum based on Learning Outcome Based Curriculum Framework (LOCF) /Choice Based Credit System(CBCS)

---

- To develop the curriculum and syllabi based on the guidelines of UGC and the principles of Outcome Based Education (OBE)/Learning Outcome Based Curriculum Framework (LOCF).
- To implement the guidelines and suggestions of the new education policy.
- To consider the Competencies and Performance Indicators of the B.Sc Medical Laboratory Technology programme defined as per the recommendations of the National Model Curriculum.
- To enhance the Course Outcomes (CO) of all the courses by focusing on skill development, employability, and entrepreneurship.
- To consider the mapping of CO to the Program Outcomes (PO) and Programme Specific Outcomes (PSO) of all the courses using the defined Competencies and Performance Indicators.

**Minutes are Reviewed and Confirmed**

### Item No : 2 BOS / 2024 /MLT / UG / 1.2

---

Objective of New Program

---

- To provide the perfect balance and academic intensity between theoretical and practical learning.
- To design the curriculum focusing on Activities/ Content with direct on Employability/Competency/ Entrepreneurship/ Skill Development / Interdisciplinary
- To demonstrate and adopt technical skill set and in depth of knowledge.
- To aid students to refine their skills.
- To discover various techniques and develop their knowledge through experimental learning.
- To deliver the Program as per UGC norms.

---

**Item No : 3 BOS / 2024 /MLT / UG / 1.3**

---

Feedback from Stakeholders to ensure that the syllabus of the courses include the state-of-the-art technologies focusing on skill development, employability, and entrepreneurship

---

**External Members:** The course is well framed and the curriculum is elaborate and focuses on inculcating the skills and knowledge required for students in the medical world..

**Academic Experts:** The course covers all the basic inputs to provide expertise training in the medical world. The Competencies and Performance Indicators (PI) are well defined for both the programmes. The CO-PO mapping is based on Knowledge Levels and is well justified.

The course explores a wide range of careers in the medical world through internships and enables students to inculcate practical skills for Entrepreneurship.

**Minutes are Reviewed and Confirmed**

---

**Item No : 4 BOS / 2024 /MLT / UG / 1.4**

---

To review the UGC policy for CBCS and LOCF curriculum

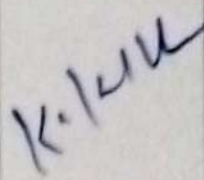
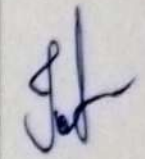
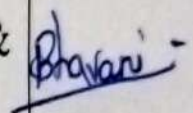
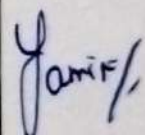
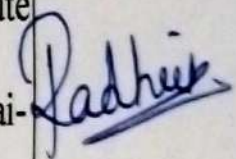
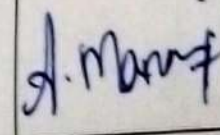
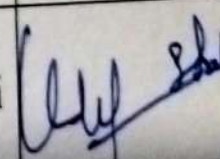
---

- Resolved that the Curriculum & Syllabus for the B.Sc Medical Laboratory Technology programme (Regulation 2024), designed as per the Learning outcome-based curriculum framework (LOCF) guidelines of UGC, effective from the Academic Year 2024-2025 be approved.

**Resolution:**

The members of the BOS adopted the following resolutions: Resolved to recommend that the Curriculum and Syllabus developed for B.Sc. Medical Lab Technology is based on Learning Outcome Based Curriculum Framework (LOCF) and Choice Based Credit System (CBCS). Newly introduced UG Program and courses focused on Activities Content with direct on Employability / Competency/ Entrepreneurship/ Skill Development / Interdisciplinary and new courses introduced during the Academic Year – 2024– 2025 is designed as per the guidelines and Model Curriculum Framework of UGC. The Board of studies approved the UG curriculum for the academic year 2024 – 2025 is enclosed **Annexures** .

**New Curriculum and Syllabi of PG Program courses focused on Activities //Content with direct focus on Employability / Competency/ Entrepreneurship / Skill development/ Interdisciplinary/ Cross Cutting Issues enclosed in Annexures**

S. No	Name of the Board Member	Designation	Institute / Industry	Signature
<b>Internal Members</b>				
1	Mr.Kishore Kanna.K M.Sc.(Radiology)	Vice Principal	Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai	
2	Mrs.Jebaseeli V M.Sc.(Biochemistry)	Assistant Coordinator	Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai	
3	Mrs.Bhavani.S M.Sc(Medical Lab Technology)	Assistant Professor	Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai	
<b>External Expert Members</b>				
1	Dr.Yamini.B M.Sc.Echocardiography Ph.D. (Cardiology)	Asst.Professor & Clinical Coordinator	Faculty of Allied Health Sciences, KM Cherian Heart Foundation-Frontier Life Line Hospitals.	
2	Dr.M.Radhika M.Sc MLT, PhD (Biochemistry)	Assistant Professor	Sri Ramachandra Institute of Higher Education & Research, Porur, Chennai-116	
3	Dr.A Mani, M.(Optometry),Ph.D (Ophthalmology)	Associate Professor	Chettinad Academy of Research and Education Kelambakkam.	
4	Mr.Vyshak M.Sc(Radiology)	Associate Professor	ACS Medical College & Hospital, Velapanchavadi	



INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)

(Deemed to be University Estd. u/s 3 of the UGC Act, 1956)

PALLAVARAM - CHENNAI

ACCREDITED BY NAAC WITH 'A' GRADE

*Marching Beyond 30 Years Successfully*

## **B.Sc. MEDICAL LABORATORY TECHNOLOGY**

**Curriculum and Syllabus 2022**

**(Based on Choice Based Credit System (CBCS)**

**and Outcome Based Education (OBE))**

**Effective from the Academic year 2023-2024**

**School of Allied Health Sciences**

## 1. SHORT TITLE AND COMMENCEMENT:

These regulations shall be called “Specific Regulations for the B.Sc. Medical Laboratory Technology course of Vels Institute of Science Technology and Advanced Studies, Deemed to be University u/s3 of UGC act 1956. These Regulations are applicable to the students who are admitted to the B.Sc. Medical Laboratory Technology in this University.

As per the decision of the Academic Council of this University, these regulations have been prepared by adopting the regulations of the VISTAS.

## 2. AIMS

The aim of the course is to

- A thorough study of Medical Lab Technology
- Working on laboratory research works
- Involvement in internships
- Real-world projects and training
- Study of Human Anatomy and Physiology

## 3. OBJECTIVES

On completion of the four years B.Sc. Medical Laboratory Technology Programme the graduates will be:

- Efficiency in using modern techniques and technologies for providing vision care.
- Demonstrating professional and clinical competence in the practice.
- Strengthening the critical acumen of students to work efficiently in inter-disciplinary and multi-disciplinary health care projects
- Nurturing their skills and preparing them for the optical clinic industry & trade

## 4. ELIGIBILITY FOR ADMISSION

1. The minimum age for admission shall be 17 years on or before 31st December of the year in which admission is sought.

2. A Candidate desiring to join the B.Sc. Operation theatre & Anesthesia Technology course should have passed the HSC/CBSE/ISC or other equivalent examination with one of the following subject combinations:

- i) Physics, Chemistry, Biology & Mathematics
  - ii) Physics, Chemistry, Botany & Zoology.
3. A candidate is required to obtain 50% in the Entrance exam conducted by the VISTAS

#### **5. DURATION OF THE COURSE:**

The duration of the B.Sc. Medical Laboratory Technology Degree course shall be 4 Years full-time programme comprising 8 Semesters including internship (Three Year Curriculum + One Year Internship) under Choice based Credit System.

#### **6. MEDIUM OF INSTRUCTION:**

English shall be the medium of instruction for all subjects of study and examinations will be conducted only in English.

#### **7. COMMENCEMENT OF THE COURSE:**

The course shall commence on August of the academic year.

#### **8. WORKING DAYS IN A SEMESTER:**

Each semester shall consist of not less than 100 working days and each academic year shall have a total of 200 working days

#### **9. REGISTRATION**

A Candidate admitted to the course shall be registered by remitting the prescribed fees along with the Application form for registration duly filled with in the stipulated dates.

#### **10. COMMENCEMENT OF THE EXAMINATIONS:**

Regular Semester Examinations will commence from last week of November and last week of April

If the date of commencement of the examination falls on Saturday, Sunday or declared Public Holidays, the examination shall begin on the next working day.



**B.Sc MEDICAL LABORATORY TECHNOLOGY CURRICULUM**

**SEMESTER 1**

Sl. No.	Category	Course Titles	Hours/Credits							Maximum Marks				
			Lecture		Tutorial		Practical		Total	IA		UA		TOTAL
			Hours	Credits	Hours	Credits	Hours	Credits	Credits	Theory	Practical	Theory	Practical	
1.1	Program Core	General Anatomy	45	3	30	1	60	2	6	25	50	75	50	200
1.2	Program Core	General Physiology	45	3	30	1	60	2	6	25	50	75	50	200
1.3	Program Core	General Biochemistry	45	3	30	1	60	2	6	25	50	75	50	200
1.4	Program Elective	Medical Law and Ethics*	30	2	-	-	-	-	2	100	-	-	-	100
1.5	Program Elective	Communication And Soft Skills*	30	2	-	-	-	-	2	100	-	-	-	100
<b>Total</b>									<b>22</b>	<b>Total</b>				<b>800</b>

## SEMESTER 2

Sl. No.	Category	Course Titles	Hours/Credits							Maximum Marks				
			Lecture		Tutorial		Practical		Total	IA		UA		Total
			Hours	Credits	Hours	Credits	Hours	Credits	Credits	Theory	Practical	Theory	Practical	
2.1	Program Core	General Pathology	45	3	30	1	60	2	6	25	50	75	50	200
2.2	Program Core	General Microbiology	45	3	30	1	60	2	6	25	50	75	50	200
2.3	Program Core	General Pharmacology	45	3	30	1	60	2	6	25	50	75	50	200
2.4	Program Elective	Medical Terminology*	30	2	-	-	-	-	2	100	-	-	-	100
2.5	Program Elective	Basic Computers & Information Science*	30	2	-	-	-	-	2	100	-	-	-	100
<b>Total</b>									<b>22</b>	<b>Total</b>				<b>800</b>

**SEMESTER 3**

Sl. No.	Category	Course Titles	Hours/Credits							Maximum Marks				
			Lecture		Tutorial		Practical		Total	I A		U A		Total
			Hours	Credits	Hours	Credits	Hours	Credits	Credits	Theory	Practical	Theory	Practical	
3.1	Program Core	Histopathology	45	3	30	1	60	2	6	25	50	75	50	200
3.2	Program Core	Cytology	45	3	30	1	60	2	6	25	50	75	50	200
3.3	Program Elective	Psychology*	30	2	-	-	-	-	2	100	-	-	-	100
3.4	Program Elective	Basic principles of hospital management	30	2	-	-	-	-	2	100	-	-	-	100
3.5	Program Core	MLT Directed Clinical Education	-	-	-	-	120	4	4	50	50	-	-	100
<b>Total</b>									<b>20</b>	<b>Total</b>				<b>700</b>

### SEMESTER 4

Sl. No.	Category	Course Titles	Hours/Credits							Maximum Marks				
			Lecture		Tutorial		Practical		Total	IA		UA		Total
			Hours	Credits	Hours	Credits	Hours	Credits	Credits	Theory	Practical	Theory	Practical	
4.1	Program Core	Clinical pathology (Haematology & Urine analysis)	45	3	30	1	60	2	6	25	50	75	50	200
4.2	Program Core	Blood Banking & Immunology	45	3	30	1	60	2	6	25	50	75	50	200
4.3	Program Elective	Medical Sociology*	30	2	-	-	-	-	2	25	-	75	-	100
4.4	Program Elective	Health Care management Theory*	30	2	-	-	-	-	2	25	-	75	-	100
4.5	Program Core	MLT Directed Clinical Education	-	-	-	-	120	4	4	50	50	-	-	100
<b>Total</b>									<b>24</b>	<b>Total</b>				<b>700</b>

**SEMESTER 5**

Sl. No.	Category	Course Titles	Hours/Credits							Maximum Marks				
			Lecture		Tutorial		Practical		Total	IA		UA		Total
			Hours	Credits	Hours	Credits	Hours	Credits		Theory	Practical	Theory	Practical	
5.1	Program Core	General Bacteriology, Immunology & Systematic Bacteriology	45	3	30	1	90	3	7	25	50	75	50	200
5.2	Program Core	Virology, Mycology & Parasitology	45	3	30	1	90	3	7	25	50	75	50	200
5.3	Program Elective	Hospital products, promotions, sales & public relations.*	30	2	-	-			2	100		-	-	100
5.4	Program Core	MLT Directed Clinical Education	-	-	-	-	120	4	4	50	50	-	-	100
<b>Total</b>									<b>20</b>	<b>Total</b>				<b>600</b>

### SEMESTER 6

Sl. No.	Category	Course Titles	Hours/Credits							Maximum Marks				
			Lecture		Tutorial		Practical		Total	IA		UA		Total
			Hours	Credits	Hours	Credits	Hours	Credits		Credits	Theory	Practical	Theory	
6.1	Program Core	Clinical chemistry -I	45	3	30	1	60	2	6	25	50	75	50	200
6.2	Program Core	Clinical chemistry -II	45	3	30	1	60	2	6	25	50	75	50	200
6.3	Program Elective	Trauma life & Cardiac care support	30	2	-	-	-	-	2	25	-	75	-	100
6.4	Program Elective	Bio-Statistics and Research Methodology Theory*	30	2	-	-	-	-	2	100	-	-	-	100
6.5	Program Core	MLT Directed Clinical Education	-	-	-	-	120	4	4	50	50	-	-	100
<b>Total</b>									<b>20</b>	<b>Total</b>				<b>700</b>

### SEMESTER 7 & 8

Sl. No.	Category	Course Titles	Hours/Credits				Maximum Marks				
			Theory	Tutorial	Practical	Total	IA		UA		Total
							Theory	Practical	Theory	Practical /Viva	
7.1	Project	Project	-	2	-	2	-	100	-	-	100
7.2	Internship	Internship	-	38	-	38	-	100	-	-	100
<b>Total</b>						<b>40</b>	<b>Total</b>				<b>200</b>

#### **11. SUBMISSION OF LABORATORY RECORD NOTE BOOKS:**

At the time of practical examination, each candidate shall submit to the examiners his / her laboratory note books duly certified by the Head of the Department as a bonafide record of the work done by the candidate

#### **12. INTERNAL ASSESSMENT:**

a) A minimum of two written internal assessment examinations shall be conducted in each subject during a semester and the Best / Average marks of two examinations shall be taken into consideration for the award of internal marks.

b) A model practical examinations shall be conducted in each subject (wherever practical have been included in the curriculum) shall be taken into consideration for award of internal marks in practical.

c) Tests will be conducted giving sufficient time for preparation.

d) No repeat, reschedule and postponement of the assessment date is permitted .Students shall compulsorily attend any three continuous assessments

#### **13. ATTENDANCE REQUIRED FOR ADMISSION TO EXAMINATIONS:**

a) No candidate shall be permitted to appear for the University examinations, unless he/she attends the course for the prescribed period.

b) Every candidate is required to put in a minimum of 80% of attendance both in theory and practical separately in each subject for admission to the examination.

c) A candidate lacking in the prescribed attendance in any subject in theory and /or practical shall not be admitted to the entire examination.

#### **14. CONDONING LACK OF ATTENDANCE**

Condoning of shortage of attendance up to a maximum of 10% in the prescribed eligible attendance for admission to year end examination rests with the discretionary power of the Vice Chancellor. A Candidate lacking in attendance should submit an application in the prescribed form and remit the stipulated fee, 15 days prior to the commencement of the theory examination, The Head of the Department should satisfy

himself on the reasonableness of the candidate's request while forwarding the application of the candidate to the Controller of Examinations, who would obtain the Vice – Chancellor's approval for admission to the examination. No application would be accepted if it is not forwarded through proper channel.

1. Condoning lack of attendance should be taken up for consideration under the following circumstances:-

a) Any illness affecting the candidate – Candidates should submit a medical certificate from registered medical practitioners.

b) Any unforeseen tragedy in the family. The parents/ guardian should give in writing about what had happened.

c). Participation in National Service Scheme and other co-curricular activities representing the University.

#### **15.RE-ADMISSION AFTER BREAK OF STUDY:**

A separate regulation is available for all the UG/PG courses of this university for the re-admission of candidates after a break of study.

#### **16.INTERNSHIP**

- Internship means 8 hours of integrated clinical duties
- Internship should be carried out as 8 Hours per day @ 48 hours per week
- Students will be supervised by the Faculties & well Trained Professionals during Internship.
- Internship will be started after passing in the third year Examination.

#### **17.YEAR END EXAMINATIONS**

- Commencement of the Examination will be in November /April
- If the date of commencement falls on Saturdays, Sundays or declared public holidays, the examination shall begin on the next working day.
- The duration of the examination of each subject is 3 hours.

Carryover of failed subjects:

- A candidate has to pass in theory and practical examinations separately in each of the subject.



- If a candidate fails in either theory or practical of the subjects, he/she has to reappear for both the Theory and Practical.
- The candidate if fails can be permitted for admission to next year.
- The candidate shall have to clear all the previous examination before appearing for the Sixth Semester examination.

#### 18. REVALUATION / RETOTALLING OF ANSWER PAPERS:

There is provision for revaluation of the answer papers of failed candidates in any examination. However, the failed candidates cannot apply for retotaling.

#### 19. CREDITS

Credits will be assigned on the basis of the lectures (L) /tutorials (T) Clinical Training (CR) /laboratory work (P) /Research Project (RP) and other form of learning in a 15-20 week schedule.

- L- One credit for one hour lecture per week (1 credit = 15 hours)
- P/T – One credit for every two hours of laboratory or practical (1 credit = 30 hours)
- CR – One credit for every two hours of Clinical Training/Clinical Rotation/Posing (1 credit = 30 hours)
- RP – One credit for every two hours of Research Project per week – Max Credit 20-25 (1 credit = 30 hours)

#### 20. GRADING SYSTEM

Based on the performance, each student shall be awarded a final grade at the end of the semester for each course. Absolute grading is used by converting the marks to grade, based on pre determined class intervals.

UGC 10-point grading system is used with pass grade modified.

Letter Grade	Grade Point	Range of Marks*
O (Outstanding)	10	85% & above
A+ (Excellent)	9	80-84.99%
A (Very Good)	8	75-79.99%
B+ (Good)	7	65-74.99%
B (Above Average)	6	60-64.99%
C (Average)	5	50-59.99%
P (Pass)	-	>50%
F (Fail) / RA (Reappear)	0	<50%
AB (Absent)	0	0

1. A candidate is declared to have pass in a course if he /she secures a minimum 50% marks the university theory & practical Examinations separately & 50% in aggregate of university theory/practical & Internal assessment put together

**Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):**

SPGA is the weighted average of the grade points obtained in all courses by the student during the semester

**SGPA Computation:**

$$SGPA = \frac{\sum_i^n (C_i \times (GP)_i)}{\sum_i^n C_i}$$

Where  $C_i$  - credits for the course,  $(GP)_i$  - the grade point obtained for the  $i^{th}$  course ,  $n$  – total number of courses and the sum is over all the courses taken in that semester, including those in which the students has secured “F” and “Ab” grades.

**CGPA Computation:**

**Computation of CGPA:**

CGPA is calculated with SGPA of all semesters to two decimal points and is indicated in final grade in mark card/transcript showing grades of all 8 semesters and their courses/subjects.

$$CGPA = \frac{\sum_i^r S_i \times (SGPA)_i}{\sum_i^r S_i}$$

where:- $S_i$ - sum of credits in  $i^{th}$  semester ,  $(SGPA)_i$ - semester grade point average earned in  $i^{th}$  semester and  $r$ - number of semester and the sum is over all the semesters under consideration. The cumulative grade point average (CGPA) is calculated by consideration all the courses taken from the first semester onwards for regular students and from third semester onwards taken for lateral entry students.

## 21. CLASSIFICATION OF SUCCESSFUL CANDIDATES:

The CGPA arrived at the completion of the course shall be the criteria for the classification of successful candidates as below:

### Cumulative Grades and Grade Points

Letter Grade	Grade Point	Range of Marks*
O (Outstanding)	10	85% & above
A+ (Excellent)	9	80-84.99%
A (Very Good)	8	75-79.99%
B+ (Good)	7	65-74.99%
B (Above Average)	6	60-64.99%
C (Average)	5	50-59.99%
P(Pass)	-	>50%
F (Fail) / RA (Reappear)	0	<50%
AB (Absent)	0	0

- a) Successful candidates who secure 75% marks and above as a course aggregate in the first appearance taking University theory, practical, project / dissertation evaluation and viva shall alone be awarded Distinction. This will also apply for award of University rank.
- b) Successful candidates who secure 60% marks and above as a course aggregate in the University theory, practical, project / dissertation evaluation and viva shall be awarded First Class.
- c) All others who secure 50-59% in gross percentage will be classified to have passed in Second Class.

## 22. PATTERN OF QUESTION PAPER FOR UNIVERSITY EXAMINATION:

### EXAMINATION QUESTION PAPER PATTERN

<b>Essay</b>	<b>2 x 15</b>	<b>= 30 Marks</b>
<b>Short Notes</b>	<b>7 x 5</b>	<b>= 35 Marks</b>
<b>Short Answers</b>	<b>5 x 2</b>	<b>= 10 Marks</b>
<b>Total</b>		<b>75 Marks</b>

### Internal Split up – Theory

1. Continuous Assessment: 10 Marks

S.no	Continuous Assessment	Marks
1	Attendance	5
2	Assignment	5

2. Internal Assessment: 15 marks Two Sessional Exams per Course

### Internal Split up – Practical

1. Continuous Assessment: 20 Marks

S.no	Continuous Assessment	Marks
1	Seminar	10
2	Record note Book	10

2. Model Practical Examination: 30 Marks

## 23. GRACE MARKS

Maximum of 8 grace marks for each subject is permitted, and grace marks should not exceed 8 marks in each subjects.

## 24. MARKS QUALIFYING FOR PASS

A candidate is declared to have passed in a course if he/she secures a minimum of 50% marks in university theory and practical examinations separately and 50% in aggregate of university theory /practical and internal assessment put together.

\*\*\*\*\*

## **FIRST SEMESTER** **GENERAL ANATOMY**

### **Course objectives:**

- Describe the structure and functions of the organ systems of the human body.
- Describe how the organ systems function and interrelate.
- Learn basic technical terminology and language associated with anatomy.
- Develop a self-identity of what it means to be “human”.

### **Unit I: Organization of the Human Body**

Introduction to the human body - Definition and subdivisions of anatomy- Anatomical position and terminology Regions and Systems of the body -Cavities of the body and their contents - Levels of organization of the body. Cell – Definition of a cell, shapes and sizes of cells - Parts of a cell – cell membranes cytoplasm, subcellular organelles and their main functions. Cell Division – Definition and main events that occur in different stages of mitosis and meiosis. Tissues – Tissues of the body - Definition and types of basic tissues - Characteristics, functions and locations of different types of tissues.

### **Unit II: Systems of Support and Movement**

1. **Skeletal system** Skeleton – Definition, axial and appendicular skeleton with names and number of bones, Types of bones. Parts of bones. Functions of bones. Name location and general features of the bones of the body. Joints – Definition and types of joints with examples. Axes and kind of movements possible. Name, location, type, bones forming, movements possible.
2. **Muscular system** Parts of the skeletal muscle. Definition of origin and insertion. Name and location of the skeletal muscles of the body. Origin, insertion, nerve supply and action of large muscles like sternocleidomastoid, pectoralis major, deltoid, Biceps brachii, Triceps brachii, gluteus, gastrocnemius and diaphragm.

### **Unit III: Control Systems of the Body**

1. **Nervous system** Sub-divisions of the nervous system , Spinal cord – Location, extent, spinal segments, external features and internal structure. Brain – Sub- divisions, location external features of medulla oblongata, pons, mid-brain, cerebellum and cerebrum. Meninges and spaces around them. Name and location of ventricles of brain and circulation of cerebrospinal fluid. Blood supply of the brain and spinal cord. Cranial nerves - Name, number, location and general distribution. Spinal nerves - Typical spinal nerve groups and number of spinal nerves. Name and location of cervical plexus and brachial plexus. Location and general distribution of the branches. Autonomic Nervous system – definition and functions.

2. **Sense organs** Location and features of the nose, tongue, eye, ear and skin
3. **Endocrine system** Names of the endocrine glands. Location and features of pituitary, thyroid, parathyroid, suprarenal, pancreas, ovaries and testes. Names of hormones produced by each gland.

#### **Unit IV: Maintenance of the Human Body**

1. **Cardio-vascular system:** Types and general structure of blood vessels. Structure and types of arteries and veins. Structure of capillaries. Shape, size, location, coverings, external and internal features of heart. Structure of heart wall, conducting system of the heart. Blood supply of the heart. The systemic arteries and veins. Name, location, branches and main-distribution of principal arteries and veins.
2. **Lymphatic system** Lymph, lymphatic vessels, name, location and features of the lymphatic organs.
3. **Respiratory system:** Names of organs of respiration, Location and features of nose, pharynx, larynx, trachea, bronchi, lungs and pleura.

#### **Unit V: Excretion of the Human Body**

1. **Digestive system:** Names of organs of digestion. Parts of alimentary canal and accessory organs. Location and features of mouth, pharynx, esophagus, stomach, small and large intestines. Location and features of salivary glands, pancreas, liver and gall bladder.
2. **Urinary system:** Names of urinary organs, location and features of kidney, ureter, urinary bladder and urethra

#### **Unit VI: Reproduction Function of the Human Body**

1. **Reproductive system** Names of male and female organs of reproduction. Location and features of scrotum, testis, epididymis, vas deferens, seminal vesicle, ejaculatory duct, prostate gland, penis and spermatic cord. Location and features of uterus and its supports, uterine tube, ovary vagina vulva and breast.

**Anatomical Regions** Simple ideas about scalp, triangles of neck, axilla, cubital fossa, mediastinum, inguinal canal, femoral triangle, popliteal fossa.

### **Practicals and Demonstrations:**

1. Identification of the parts of the microscope.
2. Identification of the epithelium in a given histological slide.
3. Demonstrate the parts of the long bone.
4. Identification of the bones and joint of the body with the articular surfaces (skeleton or X-rays)
5. Identification of the important muscles in upper limb, lower limb and head and neck.
6. Identification of the parts of the brain (cerebrum, cerebellum, brainstem, spinal cord)
7. Identification of the cardiac chambers in a specimen.
8. Identification of the major vessels of heart – aorta and pulmonary trunk.
9. Identification of the cardiac field in chest X-ray.
10. Identification of the nasal cavity, naso pharynx, trachea, lung and pleura in a given specimen.
11. Identification of the lung shadow, costophrenic angle in a chest X-ray.
12. Identification of the stomach, pancreas, liver, small intestine and large intestine specimens.
13. Identification of the stomach, intestinal shadows in plain or contrast abdomen X – ray.
14. Identification of the kidney, Ureter and urinary bladder in specimen.
15. Identification of the renal pelvis, Ureter and urinary bladder in intravenous pyelogram
16. Identification of the thyroid gland in cadaveric specimen

### **Recommended books:**

1. MARIANO S.H. DIFIIORE: Atlas of Human Histology, 5th Ed. 1981, Lea and Feliger
2. B.D. CHAURASIA: Handbook of General Anatomy, 2nd Ed., CBS Publishers and Distributors, New Delhi - 110 032.

## **GENERAL PHYSIOLOGY**

### **Course Objectives:**

- Comprehend basic terminologies used in the field of Human Physiology
- Define and describe basic Physiological Processes governing the normal functioning of the human body
- Apply this knowledge in their Allied Health Science practice

### **UNIT I: GENERAL PHYSIOLOGY**

Concept of Homeostasis - Cell structure and functions -Transport across membranes

Nerve structure, classification of nerve fibres, Muscles- classification, structure, Neuro-Muscular junction (NMJ), Muscle contraction – mechanism, types.

Body fluid volumes, compartments, and composition - Blood composition and functions - Plasma proteins – Erythrocytes – Morphology and functions , Leucocytes – Morphology and functions, Platelets- Morphology and functions Blood groups.

### **UNIT II: DIGESTIVE SYSTEM, SKIN & EXCRETORY SYSTEM**

Salivary glands- Nerve supply, functions of saliva, Gastric juice- composition & functions of gastric juice. Pancreatic juice – composition, functions and regulation of Pancreatic juice, Bile – composition, functions of bile & bile salts. Succusentericus and small intestinal movements, Deglutition, vomiting, functions of large intestine

Structure of sweat glands; temperature regulation

Structure of Nephron and its blood supply, Juxta Glomerular Apparatus (JGA) Formation of urine- Filtration, Reabsorption & Secretion, Counter-Current mechanism, Micturition.

### **UNIT III: ENDOCRINE SYSTEM & REPRODUCTION**

Hypothalamohypophyseal inter relationship - Anterior pituitary hormones and their functions - Posterior pituitary hormones and their actions - Thyroid hormones, biosynthesis and functions - Parathyroid hormones, functions Insulin, Glucagon, actions and Diabetes mellitus - Adrenal cortex hormones and their functions. Adrenal medullary hormones and their actions

Male reproductive organs - Spermatogenesis and Testosterone actions, Female reproductive organs - Menstrual cycle



#### **UNIT IV: RESPIRATORY SYSTEM**

Structure of upper and lower respiratory tract. Muscles of respiration and Mechanism of respiration. Lung volumes and capacities – definitions, normal values, intra pulmonary and intra pleural pressures, surfactant Oxygen transport, Carbon-dioxide transport - Neural and chemical regulation of respiration - Hypoxia, cyanosis

#### **UNIT V: CARDIOVASCULAR SYSTEM**

Cardiac muscle, action potential & conducting system of the heart, Cardiac cycle, ECG, heart sounds Cardiac output-Definition, factors regulating cardiac output and measurement of cardiac output. Blood pressure – Definition, measurement, factors maintaining B.P, Regulation of B.P, Regional circulation – Coronary and Cerebral

#### **UNIT VI: NERVOUS SYSTEM & SPECIAL SENSES**

Structure & Properties of Neuron - Nerve – Classification, injury -Types and properties of Receptors Synapse and synaptic transmission, Reflex and its properties ,Spinal cord – Ascending & Descending tracts Thalamus, Basal ganglia, Cerebellum, Cerebral cortex, Hypothalamus & Cerebrospinal fluid - Autonomic nervous system.

Vision, Audition, Olfaction, Gustation

#### **Practical:**

1. Recording of Arterial Blood Pressure (BP)

#### **Practical Demonstration:**

1. Determination of RBC count
2. Determination of WBC count
3. Differential leucocyte count (DLC)
4. Determination of Hb, PCV & ESR.
5. Determination of Blood groups, Bleeding and clotting time.
6. Charts & Instruments – Spotters

#### **Recommended Book**

Basics of Medical Physiology (Third edition) by D. Venkatesh/ H.H. Sudhakar

## **GENERAL BIOCHEMISTRY**

### **Course Objectives:**

To have a knowledge about the chemistry and metabolism of various macromolecules- carbohydrate, protein and lipids

- To learn about enzymes, vitamins, minerals and nutrition
- To know the structure and function of Haemoglobins, Nucleic acids.
- To learn about the organ function tests like Liver Function Tests and Renal Function Tests.

### **Unit – I: Carbohydrates**

Classification of carbohydrates and their biological importance, reducing property of sugars.

**Metabolism of Carbohydrates** : Digestion and Absorption of carbohydrates, steps of Glycolysis and energetics, steps of TCA cycle and energetics, steps of Glycogen synthesis and breakdown, significance of HMP shunt pathway, definition and steps of Gluconeogenesis, Galactose metabolism , Diabetes mellitus , Galactosemia.

**Bioenergetics:** Importance of ATP, outline of respiratory chain

### **Unit – II: Lipids**

Classification of lipids, essential fatty acids, functions of cholesterol, triglycerides, and phospholipids

**Metabolism of Lipids** : Digestion and Absorption of lipids, steps of  $\beta$  oxidation of fatty acids, types and functions of lipoprotein, Lipid profile, hyper cholesterolemia

**Haemoglobin:** Structure and functions of Haemoglobin.

### **Unit – III: Proteins**

–Classification of amino acids, structure of proteins, plasma proteins, immunoglobulins.

**Metabolism of Proteins:** Digestion and absorption of proteins, transamination, deamination, steps of urea cycle, Phenylketonuria, Alkaptonuria, Transmethylation, products derived from Glycine and tyrosine

**Nucleic acids:** Structure and function of DNA & RNA, Types of RNA

### **Unit – IV: Enzymes**

Definition, classification, coenzymes, factors affecting enzyme activity, Types and examples of enzyme inhibition.

**Function Tests:** Liver function tests, Renal function tests

**Vitamins :** Classification, Fat soluble vitamins: Functions, source, deficiency manifestations of vitamin A, D E and K, Functions and deficiency manifestations of vitamin C, co-enzymic forms and deficiency manifestations of B-complex vitamins.

### **Unit – V: Nutrition & Minerals**

Basal metabolic rate (BMR), Specific Dynamic Action (SDA), Glycemic index, Dietary fiber, Balanced diet, Protein Energy Malnutrition (PEM).

Calcium, Phosphorus, Iron, iodine. Outline of PH homeostasis

## **BIOCHEMISTRY SYLLABUS FOR PRACTICALS – (UNDER – GRADUATES)**

### **QUALITATIVE TESTS OF MONOSACCHARIDES (GLUCOSE AND FRUCTOSE)**

1. Molisch's test
2. Fehling's test
3. Benedict's test
4. Seliwanoff's test

### **QUALITATIVE TESTS OF LIPIDS**

1. Solubility tests
2. Emulsification tests
3. Saponification tests

### **QUALITATIVE TESTS OF PROTEINS**

1. Isoelectric precipitation tests
2. Heat coagulation tests

### **Text books Recommended:**

1. Textbook of Biochemistry for Paramedical Students by Dr.P.Ramamoorthy
2. Essentials of Biochemistry by U. Sathyanarayana

## **MEDICAL LAW AND ETHICS**

Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society's legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.

Medical ethics has developed into a well based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical

Problems that arise in practice". Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum.

Few of the important and relevant topics that need to focus on are as follows:

1. Medical ethics - Definition - Goal- Scope , Introduction to Code of conduct
2. Basic principles of medical ethics
3. Confidentiality
4. Malpractice and negligence
5. Rational and irrational drug therapy
6. Autonomy and informed consent
7. Right of patients
8. Care of the terminally ill and Euthanasia
9. Organ transplantation
10. Sentinel events

### **RECOMMENDED BOOKS**

Medical ethics by C.M.Francis

## **COMMUNICATION AND SOFT SKILLS**

1. Basic Language Skills: Grammar and Usage.
2. Business Communication Skills. With focus on speaking - Conversations, discussions, dialogues, short presentations, pronunciation.
3. Teaching the different methods of writing like letters, E-mails, report, case study, collecting the patient data etc. Basic compositions, journals, with a focus on paragraph form and organization.
4. Basic concepts & principles of good communication
5. Special characteristics of health communication
6. Types & process of communication
7. Barriers of communication & how to overcome

### **SECOND SEMESTER**

## **GENERAL PATHOLOGY**

### **Course objectives:**

1. Describe the features of inflammation and cellular adaptation, cell injury
2. Identify and describe the features of haemodynamic disorders and deficiency diseases
3. Understand and describe the pathogenesis and pathology of various systemic disorders

### **Unit I: Introduction**

Concept of diseases, classification of lesions - Inflammation and repair  
- Cellular adaptation, Cell injury, necrosis and gangrene Haemodynamic disorders including hemorrhage, shock, embolism and thrombosis.

### **Unit II: Infections**

Tuberculosis - Leprosy and Typhoid. **Unit III:**

**Deficiency diseases** Anaemias

### **Unit IV: Tumor Pathology**

Tumors – Terminologies, Nomenclature. Differences between benign and Malignant tumors,  
Tumors – Etiology, pathogenesis and spread of tumors.

### **Unit V: Systemic Disorders**

**Heart:** Coronary Heart Disease (Ischemic Heart Disease) including atherosclerosis Congenital and Valvular Heart Diseases

**Respiratory System-** Bronchial Asthma, Emphysema, Bronchiectasis

**Bone and Joints** – Autoimmune diseases, septic arthritis, osteomyelitis, rheumatoid arthritis

**Diseases of the Kidney** - Diseases of other parts of the Urinary System

**Central Nervous System** CNS infections

**Muscle** - Diseases of muscle including poliomyelitis, myopathies

**Gastrointestinal System** Diseases of Esophagus, Stomach and Intestine, Diseases of Liver and Pancreas.

**Reproductive system**-Diseases of uterus, cervix, ovaries and testis.

**Recommended Textbook:**

Textbook of Pathology, Harsh Mohan, 3rd edition

### **Pathology Lab**

**Learning Objective:**

The Gross specimens and instruments relevant to the disease processes and diseases taught will be shown and explained.

**Unit I: Gross Specimens**

1. Gangrene Bowel
2. Tuberculosis of Lung
3. Lipoma
4. Squamous cell Carcinoma of Foot
5. Infective Endocarditis
6. Left Ventricular Hypertrophy
7. Osteoclastoma
8. Osteogenic Sarcoma
9. Osteomyelitis
10. Chronic Pyelonephritis-Kidney

**Unit II: Haematology Instruments:**

1. Sahli's Haemoglobinometer
2. Sahli's pipette
3. Westergren's tube
4. Wintrobe's tube
5. Neubauer's Chamber

6. RBC pipette
7. WBC pipette

## **GENERAL MICROBIOLOGY**

### **Course Objective:**

At the end of the semester the students should be able to,

1. Know the concepts of sterilization and disinfection procedures and their applications.
2. Understand the basic principles of immunology.
3. Understand the basic fundamental aspects of bacteria, virus, fungus and parasites, and study the common disease caused by them.

### **Unit I: Introduction**

History and introduction to microbiology, study the morphology of bacterial cell and their functions.

### **Unit II: Basic concepts about infection**

Source, portal of entry & spread of immunity, biomedical waste management and standard precautions

### **Unit III: Sterilization**

Sterilization and disinfection procedures and their application.

### **Unit IV: Infections**

Common bacterial, viral, fungal and parasitic pathogens and the diseases caused by them with preventive and treatment measures.

### **Unit V: Applied microbiology**

Sexually transmitted diseases, hospital acquired infections, urinary tract infections, skin and soft tissue infections and anaerobic infections.

### **Recommended books**

1. Prof C P Baveja - Text book of Microbiology.
2. Satish Gupte - Text Book of Microbiology

### **Microbiology Lab**

### **Learning Objective:**

This module aims at providing practical knowledge in the recognition of common pathogenic organisms, infectious diseases and their lab diagnosis.

### **1. Spotters:**

- a) Disposable syringe
- b) Sterile cotton swab
- c) Bacterial filters
- d) Anaerobic jars
- e) Gramstained smears showing grampositive cocci and gram negative bacilli
- f) Gramstained smears showing Candida
- g) Culture growth of Aspergillus and dermatophytes
- h) Bacterial culture media plates (Blood agar, chocolate agar and MacConkey's agar)
- i) Antibiotic susceptibility test
- j) Ascaris lumbricoides
- k) Taenia

**2. Clinical case discussion with charts:**

- a) Skin and soft tissue infections
- b) Clostridia infections
- c) Ring worm/ Tinea infections
- d) Food poisoning
- e) Gastroenteritis

**Learning outcomes:**

At the end of the module, the student must be able to have brief practical knowledge on infectious disorders.

**Recommended reading**

Practical Microbiology - Prof. C.P.Baveja



## **GENERAL PHARMACOLOGY**

### **Course Objectives:**

1. To understand the terminologies and basic principles of pharmacokinetic and pharmacodynamics involved in the use of drugs.
2. To understand the pharmacological action and mechanism of action of common drugs used for different disease conditions.
3. To know the therapeutic uses and adverse effects of common drugs used for different disease conditions

### **UNIT 1: Introduction**

General pharmacological principles-Definition-Routes of drug administration-Pharmacokinetics-Pharmacodynamics-Adverse drug effects

### **UNIT 2: Drugs acting on Autonomic Nervous System, Peripheral Nervous System and Drugs acting on Central Nervous system**

General considerations-Cholinergic system & drugs-Anticholinergic drugs- Adrenergic drugs-antiadrenergic drugs-Drugs acting on autonomic ganglia.

Skeletal muscle relaxants-Local anaesthetics, General anaesthetics -Ethyl & Methyl alcohol-Sedatives, Hypnotics

Antiepileptics-Antiparkinsonian drugs-Drugs used in mental illness-Opioid analgesics and Nonopioid Analgesics

Nonsteroidal Anti-inflammatory drugs

### **UNIT 3: Cardiovascular drugs, Drugs affecting Blood & Blood formation and Drugs onRespiratory system**

Cardiac glycosides, Antiarrhythmic drugs, Antianginal drugs, Anti-hypertensives and Diuretics, Hematinic, Erythropoietin, Drugs affecting-coagulation, Fibrinolytic and Antiplateletdrugs, Treatment of cough and anti-asthmatic drugs

### **UNIT 4: Antimicrobial drugs**

General consideration-Antibiotics-Antibacterial agents-Antitubercular drugs- Antifungal-Antipyretic-Antiviral-Antimalarial Antiamoebic-Antiprotozoal drugs- Cancer Chemotherapy, Antiseptic-Disinfectant-others.

### **UNIT 5: Hormones & related Drugs, Drugs used in gastrointestinal diseases &miscellaneous drugs**

Corticosteroids, Antithyroid drugs and Drugs for Diabetes Mellitus, Treatment of Vomiting, Constipation, Diarrhea and Treatment of peptic ulcer Vitamins, Vaccines, Sera andchelating agents.

### **Recommended books:**

1. Prep Manual for Undergraduates in Pharmacology by Tara V Shanbag, 2nd edition
2. Pharmacology for Dental and Allied Health Sciences by PadmajaUdaykumar, 3rd edition

**Learning Objective:**

This module is intended to discuss the various modalities of drug delivery and instruments relevant to it.

**Instruments:**

Needles Intravenous, Intrathecal, Spinal, Intra arterial

**Students Discussion:** Syringes, Tuberculin, Insulin, I.V cannula, Scalp. Vein set

**Students Discussion:** Enema can, Inhalers, Spacers, and Nebulizers **Students**

**Discussion:** Tablets – Enteric coated, Sustained release, Sub-lingual **Students**

**Discussion:** Capsules, Spansules, Pessary, Suppository

**Students Discussion:** Topical Preparation, Ointment, Lotion, Powder, Drops – eye / ear

**Charts:** Mechanism of action of drugs, adverse effects, toxicology

**Spotters:** drugs

**Text books suggested for reading:**

1. Text book of pharmacology for Dental & Allied Health Science 2nd edition  
Padmaja Udaykumar
2. Pharmacology for dental students Tara V Shanbhag, Smita Shenoy, Veena Nayak
3. Principles of pharmacology 2nd edition H.L. Sharma & KK Sharma

## **MEDICAL TERMINOLOGIES AND RECORD KEEPING**

This course introduces the elements of medical terminology. Emphasis is placed on building familiarity with medical words through knowledge of roots, prefixes, and suffixes. Topics include: origin, word building, abbreviations and symbols, terminology related to the human anatomy, reading medical or dread reports, and terminology specific to the student's field of study. Spelling is critical and will be counted when grading tests.

Topics to be covered under the subject are as follows:

1. Derivation of medical terms.
2. Define word roots, prefixes, and suffixes.
3. Conventions for combined morphemes and the formation of plurals
4. Form medical terms utilizing roots, suffixes, prefixes, and combining roots.
5. Interpret basic medical abbreviations/symbols.
6. Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system, musculoskeletal system, respiratory system, cardiovascular system, nervous system, and endocrine system.
7. Interpret medical orders/reports.
8. Data entry and management on electronic health record system.

## **BASIC COMPUTERS AND INFORMATION SCIENCE**

The students will be able to appreciate the role of computer technology. The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data work sheet and PowerPoint presentation. Topics to be covered under the subject areas follows:

1. Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
2. Input output devices: Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision- input devices),output devices(monitors, pointers, plotters, screen image projector, voice response systems).
3. Processor and memory: The CentralProcessing Unit (CPU), main memory.
4. Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass to rage devices.
5. Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing ,minimizing and maximizing, etc.).
6. Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.
7. Introduction to Excel: introduction, about worksheet, entering information, saving work books and formatting, printing the worksheet, creating graphs.
8. Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
9. Introduction of Operating System: introduction, operating system concepts, types of operating system.
10. Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
11. Internet and its Applications: definition, brief history, basic services (E- Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
12. Application of Computers in clinical settings.

### **Practical on fundamentals of computers:**

Learning to use MS office: MS word, MS Power Point, MS Excel. To install different software

## SEMESTER – III

### **1. Histopathology – Theory(UE)**

**UNIT I** : Introduction – Receipt and despatch of biopsy material Documentation **UNIT II** :

Fixation Grossing, Tissue processing

- a) (Dehydration, clearing, impregnation, embedding)
- b) (Decalcification)

**UNIT III** : Microtomy

- Knives & Knife sharpening
- Tissue sectioning, mounting etc. **UNIT**

**IV** : Principles of staining

Staining techniques – Routine & special

**UNIT V** : Filling, indexing & preservation of blocks etc.

Frozen section (Cryostat) Museum

techniques

### **Histopathology (Practical)**

Note: Exercises / Spotters to be chosen by the examiners

**EXERCISE:** (3X10=30 marks)

- Tissue sectioning and H & E staining (1x10=10 marks)
- Special staining: (Any one of the following) (1x10=10 marks)
  - Perls stain
  - PAS stain
  - Giemsa stain
  - Ziehl – Neelsen stain
  - Reticulin stain
  - van Gieson stain
- Any one of the following: (1x10=10 marks)
  - Embedding

- Frozen sectioning

SPOTTERS: (5x2=10 marks) (Any five of the following)

- Lab materials – Name & application of each:
  - Tissue cassette
  - Paraffin wax
  - Disposable blade for microtome
  - DPX
  - Waterbath
  - Diamond pencil
  - Cover slip
- Mention two applications of each:
  - Formalin
  - Chloroform
  - Alcohol
  - Xylene
- Charts / photographs:
  - Histokinette
  - Microtome
  - Cryostat
  - Embedding station

## **2. Cytology – Theory Schedule**

- 1) Introduction to FNAC & Exfoliative cytology
- 2) **Fixation of smears**
- 3) Coating fixatives
  - a. Polyethylene glycol solution
  - b. Diaphane solution
- 4) Rehydration of air dried smears
- 5) **Mailing of unstained smears**
- 6) Preservation of fluid specimens prior to processing – Fresh material
  - a. Specimens with a high mucous content
  - b. Specimens with a high protein content

- c. Specimens with a low mucous or protein content
- d. Specimens with low PH
- 7) Pre fixation of material
  - a. Ethyl alcohol (50% solution)
  - b. Sacromannos fixative
  - c. Mucolox
- 8) Preparation of fluid smears for microscopic examination
  - Direct or sediment smears on glass slides (fresh / clotted / bloody / prefixed)

#### **UNIT II:**

- 1) Processing of fluids
  - a. Sputum, bronchial aspirates, bronchial washings, gastric washings
  - b. Urine & other watery fluids
  - c. Cerebrospinal fluid

#### **UNIT III:**

- 1) Cytocentrifuge preparations
  - a. Shandon's cytospin
  - b. Unloading the machine
  - c. Operation
  - d. Comments
  
- 2) Preparation with membrane filters
  - a. Materials needed
  - b. Specimen requirements
  - c. Method of filtration
- 3) Preparation of cell blocks
  - a. Fixed sediment method
  - b. Bacterial agar method
  - c. Plasma thrombin clot method

#### UNIT IV:

- 1) Preparations of stains and solutions used in the Papanicolau method
  - a. Graded alcohols
  - b. Bluing solutions
  - c. Preparation of Harris, Mayer, Lillie Mayer and Gill Haematoxylin
  - d. EA50, EA36, EA65 and Orange G
- 2) Stains for hematologic material and air dried smears
  - a. Wright stain
  - b. Giemsa stain
  - c. Wright Giemsa stain
  - d. Modified May Grunwald Giemsa stain

#### UNIT V:

- 1) Important factors influencing staining results
  - a. Maintenance of solutions and stains
  - b. Dipping slides
  - c. Intensity of staining reaction
  - d. Contamination control
  - e. Important factors influencing the staining results of filters
  - f. Destaining slides
  - g. Timing
  - h. Dye solubility and impurities
  - i. Total dye content
  - j. Stains with special purpose depending on category, use stain and fixative
- 2) Mounting the cell sample
  - a. Mounting medium
  - b. Dissolving nuclear pore filters prior to staining
  - c. Dissolving nuclear pore filters after staining
  - d. Cover slips
  - e. Cover slipping the entire sample



- f. Method of cover slipping glass slides and filters
- g. Cooling slides

3) Stains used in hormonal evaluation

4) Stains used in the identification of sex chromatin

### **Cytology –Practical**

Note: Exercises / Spotters to be chosen by the examiners

EXERCISE: (3x10=30 marks)

- Pap staining (1x10=15 marks)
- Any one the following: (1x10=15 marks)
  - Centrifuging fluid, making smear out of it and staining it with MGG (or)Leishman (or)Wright-Giemsa stain
  - Preparation of cytoteK smear and staining it with MGG (or) Leishman(or) Wright-Giemsa stain

SPOTTERS: (5X2=10 marks)

- Lab materials – Name & application of each:
- (Any two of the following) (2x2=4 marks)
  - CytoteK cassette
  - Pasteur pipette
  - KoplIn jar
  - Diamond pencil
  - Mention two applications of the following: (Any one) (1x2=2 marks)
  - 95% ethanol
  - Absolute methanol
  - Xylene
- Charts: (Any two of the following) (2x2=4 marks)
  - Pap smear – normal
  - Pap smear – malignancy

### **REFERENCE**

Diagnostic Cytology and its Histopathologic Bases by “Leopald G Koss”, Thir

## **Basic Principles Of Hospital Management**

(Common to all specialties – Anesthesia Technology, Cardiac Technology, Clinical Laboratory Technology, Renal Dialysis Technology, Radiology & Imaging Science Technology and Perfusion Technology)

### UNIT I: Introduction to management & Organization

The evolution of Management, Definition and importance of Management. Planning – Organizing – staffing – Motivating – Leading – Controlling. Management of health care units (in brief). Individual behaviour in organization; organizational functioning (Group / Individual); Perception; Motivation MBO; Organizational Development.

### UNIT II: Planning and Management of Hospitals & Clinical Services:

Building and physical layout – space required for separate function – Planning of infrastructure facilities, clinical services, equipment & Human resources – Types of Hospitals. Organization and administration of various clinical services; outpatient services. In-patient services, emergency services, operation theatres, ICU's and super specialty services.

#### Unit III: Organizing of support clinical services & Hospital management:

Imaging – CSSD – Laboratory – Blood Bank – diet – Medical Records – Mortuary. Housekeeping – Maintenance (Water, Electricity, Civil, Air Conditioning, Lift) – Pest Control – transport – Security. Forecasting – Purchasing & procurement (Sourcing, methods and procedures). – Storing & Issuing, Concept of inventory control, Maintenance of equipments and contracts (with special reference to major biomedical equipments). Trends in financing of Health and Hospital Services – Classification of Hospitals depending on source of financing – roles of financial institutions.

#### Unit IV: Personnel and quality Management in Hospital & Marketing:

Concepts – Manpower planning – Training & Developments – Team Building – Conflict Management – Performance appraisal – Office rules and regulations Outline of Strategic Planning and Marketing. Concepts of quality – Professional Audit System – QA program – Medical Audit – Quality Circle – TQM – Patient Satisfaction – ISO 9000. A brief outline – computerization in hospital departments. Concept, Techniques, Indicators, Evaluation of Efficiency & Effectiveness evaluation of hospital and medical care services.

#### Unit V: Ethical, current issues and Legal Aspects of Hospitals management services:

Laws related to Hospital – Medico Legal Cases law of Torts – Autopsy – Dying declaration – CPA. – Waste Management – Telemedicine – Organ Transplantation – Rehabilitation Service – Health Insurance. Operations Research and Quantitative Methods in Hospital Administration & Nursing Services in a Hospital.

# PSYCHOLOGY

## **UNIT 1: Basic Concepts of Psychology**

Definition of Psychology, Origin of Psychology - Philosophical roots of psychology, Schools of Psychology –Structuralism – Gestalt – Functionalism – Behaviorism - Psychoanalysis – Humanistic. Fields of Psychology - Work of a psychologist – Applications of psychology.

## **UNIT 2: Learning principles and methods**

Definition of learning, Factors In The Process of Learning Classical conditioning - Operant Conditioning – The principle of reinforcement and Punishment. Theory of learning. Cognitive learning- Latent learning, Insight learning, and Imitation.

## **UNIT 3: Motivation, Emotion, Memory and forgetting**

Motivation - Definition of motivation – Theories of motivation - Physiological basis of motivation – Motivational factors in aggression – Self-actualization motivation. Emotion – Emotional expression – Theories of emotions. Kinds of remembering – Retrieval processes – The nature of forgetting – Two process theories of memory – Improving memory –Language and thought – Symbols and concepts – Structure – Forms of thought - Thinking and reasoning – Concept formation.

## **UNIT 4: Development, Sensory Processes and Perception.**

Erikson's stages of psychosocial development Lawrence Kohlberg's stages of moral development Freud's Stages of Psychosexual Development Physiological basis of behavior – The brain and nervous system – The sensory process , Some general characteristic of senses – Five senses, Perception: Organization – The role of learning in perception – Perception and attention –Perceptual process.

## **UNIT 5: Intelligence & Personality**

Theories of intelligence – Measuring Intelligence – Kinds of intelligence tests – Ability – Formation of aptitude and attitude – Aptitude tests –Creativity and its tests. Personality – Definition of Personality – Theories of Personality – Assessment of Personality. Social Factors Influencing Personality.

## **UNIT 6: Social Psychology**

Definition, Nature, Subject Matter and Scope Of Social Psychology-Applications and Importance of Social Psychology, Groups: Definition and Type- Primary And

Secondary Groups Social Interaction, Social and Inter-Personal Relations. Inter- personal attraction – Love and Companionship. Prosocial-behavior. Modes of empathy: self – other differentiation and development of empathy. Social influence: attitude and conformity. Definition - Characteristics and Classification of Crowd. Leadership: Definition and characteristics, Defense Mechanisms, frustration and conflict, sources of frustration and conflict, types of conflicts. Aggression and Types of aggression.

## **UNIT 6: Health Psychology**

Definition of Health Psychology -Relating Health Psychology to other fields Clinical Health Psychology, Public Health Psychology, Community Health Psychology, Critical Health Psychology

Abnormal Psychology: Concepts of normality and abnormality, causation of mental illness, neuroses, psychoses, psychosomatic disorders, measures to promote mental health.

Stress - Definitions- Models of Stress – Theories of Stress - Stress reactions – Coping and Stress Management techniques, Pain and its management - Psychological reactions of a patient to loss –

Stages of Acceptance by Kubler-Ross.

## REFERENCES:

1. Clifford T. Morgan, Richard a. King, John R. Weis and John Schopler, "Introduction to Psychology" – 7th Edition. Tata McGraw Hill Book Co. New Delhi, 1993.
2. Baron, R. A., & Byrne, D (2006), "Social psychology", New Delhi: Prentice hall of India private limited.
3. Elliot Aronson, Timothy D. Wilson, Robin M. Akert, Samuel R. Sommers, "Social psychology" 9<sup>th</sup> edition published by Pearson education, Inc., 2006
4. Shelley E. Taylor. "Health Psychology" Third Edition. McGraw Hill International Editions, 1995.
5. Swaminathan, V.D, Latha Sathish, "Psychology for Effective Living", Department of Psychology, University of Madras.
6. Coleman, James. 1980. "Abnormal Psychology and modern life". New Delhi: Tata McGrawHill Ltd.

## SEMESTER – IV

### **1. CLINICAL PATHOLOGY (HEMATOLOGY & URINE ANALYSIS** **– THEORY (UE)**

#### **UNIT I:**

- 1) Components of blood and their functions
- 2) Haematopoietic system of the body
- 3) Specimen collection for haematological studies
- 4) Discarding procedures
- 5) Cleaning of laboratory glassware in hematology
- 6) Determination of Hb concentration
- 7) Calculation of blood cell indices – MCA, MCH & MCHC
- 8) Estimation of erythrocyte sedimentation rate
- 9) Estimation of packed cell volume

#### **UNIT II:**

- 1) Peripheral smear examination-staining, interpretation, normal & abnormal cells,parasites
- 2) Reticulocyte count
- 3) Counting on hemocytometer
- 4) Automated systems in hematology

### **UNIT III:**

- 1) Approach to the diagnosis of anemia
    - a. Screening for sickle cell anemia
    - b. Estimation of fetal Hb
    - c. Hemoglobin electrophoresis
    - d. Osmotic fragility test
    - e. Heinz body preparation
  - 2) Lupus erythematosus (LE) cell preparation
  - 3) Approach to the diagnosis of leukemias
    - Cytochemical tests and other investigations
  - 4) Preparation of bone marrow smears for microscopic examination
- ### **UNIT IV:**
- 1) Haemostasis
  - 2) Mechanism of blood coagulation
  - 3) Fibrinolysis
  - 4) Bleeding time determination
  - 5) Whole blood clotting time
  - 6) Thrombin time
  - 7) Clot retraction and lysis time
  - 8) Preparation of blood samples for coagulation test
  - 9) PT, PTT, APTT, Plasmarecalcification time, thrombin time
  - 10) Lab diagnosis of bleeding disorders

### **UNIT V:**

- Urine analysis with manual & strip methods
- CSF analysis
- Analysis of serous fluids, synovial fluids, gastric juice
- Semen analysis

## **2. CLINICAL PATHOLOGY (HEMATOLOGY & URINE ANALYSIS)** **- PRACTICAL**

Note: Exercises / Spotters to be chosen by the examiners

**EXERCISE: (3x10=30 marks)**

- **Smearing peripheral blood, staining with Leishman stain and differential counting (1x10=10 marks)**
- **Any one of the following: (1x10=10 marks)**
  - Urine physical & chemical examination for the presence of reducing sugar, protein, blood, ketone – manual method
  - Urine physical & chemical examination for the presence of reducing sugar, protein, blood, ketone – strip method
- **Any one of the following: (1x10=10 marks)**
  - Hb estimation by colorimeter
  - Estimation of ESR
  - Total count on hemocytometer
  - Staining of reticulocytes
  - Semiautomated PT
  - Semiautomated aPTT
  - Urine microscopic examination
  - Fluid – Physical examination, Total count
  - Fluid – differential count on a stained smear
  - 
  - **SPOTTERS: (5X2=10 marks) (Any five of the following)**
- **Lab materials – Name & application of each:**
  - Vacutainer – Lavender / Blue / Green / Grey topped
  - ESR tube
  - Cuvette
  - PCV tube

- Pasteur pipette
- Micropipette
- RBC pipette
- WBC pipette
- Neubauer chamber
- Bone marrow needle
- Lancet
- Slide identification:
  - Malaria
  - Iron deficiency anemia
- Charts:
  - Microfilaria
  - Reticulocyte
  - Sickle cell
  - Chronic myeloid leukemia

**EXAM PATTERN:**

Exercise = 30 marks

Spotters / Charts = 10

marks Viva = 20 marks

**REFERENCE**

*“Medical Laboratory Technology: Methods and Interpretations” by R. Sood, 6th edition*



## **BLOOD BANKING AND IMMUNOLOGY – THEORY (IE)**

### **UNIT I – Immunology**

- Introduction to immunology
- Cells of Immune System
- Complement pathway
- Cytokines
- Hypersensitivity reactions
- HLA and Tissue typing
- Blood group genetics
- Elisa, Western blot

### **UNIT II-Introduction to immunohematology-**

- Introduction to immunohematology
- Characteristics of antigens – antibodies
- Factors influencing antigen – antibody reactions
- Principles of antibody potentiators
- Direct antiglobulin test
- Indirect antiglobulin test
- Sources of error in antiglobulin test
- Blood banking reagents
- Routine testing procedures in immunohematology laboratory
- ABO blood group system
- Rh blood group system
- Other blood groups

### **UNIT III- Blood Banking Technology**

- Blood donor selection
- Blood donor reactions

- Blood collection
- Blood component preparation and storage
- Blood component uses
- Pretransfusion testing
- Blood administration
- Adverse reactions of blood transfusion

#### **UNIT IV-Transfusion Transmitted Diseases and safety precautions**

- Transfusion transmitted diseases
- HIV, HBsAg, HCV, Syphilis and Malaria
- Testing for TTI
- Universal precautions

#### **UNIT V- Quality Assurance and Regulation of Blood Bank Industry**

- Blood bank licensing issues
- Good manufacturing practices
- Blood bank safety programs
- Sickle cell
- Chronic myeloid leukemia
- LE cell

**EXAM PATTERN: (UE) Total marks – 60 Exercise = 30**

**marks**

Spotters / Charts = 10

marks Viva = 20 marks

#### **REFERENCE**

*“Medical Laboratory Technology: Methods and Interpretations” by R. Sood, 6th edition*

## **2. BLOOD BANKING & IMMUNOLOGY PRACTICALS**

Note: Exercises / Spotters to be chosen by the examiners

**Exercise: Any three of the following: (10x3= 30 marks)**

1. Blood grouping & Rh typing
2. Cross matching
3. Direct Coombs test
4. Indirect Coombs test
5. TTI rapid tests
6. Antisera affinity & avidity

**Spotters:** Any five of the following: (2x5 = 10 marks) (1 mark for identification and 1 mark for mentioning the use)

1. Antisera
2. Gel cards
3. Pasteur pipette
4. Elisa plates
5. Antiglobulin reagents
6. TTI rapid test rate
7. Blood bags – single, double, triple
8. Fresh frozen plasma
9. Platelet concentrate
10. Leukodepletion filters

**Viva = 20 marks**

**EXAM PATTERN: (UE) Total marks – 60**

Exercise – 30

marks Spotters –

10 marks Viva –20

marks

# **HEALTH CARE MANAGEMENT**

## **UNIT I: Concept of Health Care and Health Policy**

Health in Medical Care, Indigenous systems of Health Care & their relevance, Framework for Health Policy Development.

## **UNIT II: Health Organisation**

Historical development of Health Care System in the third world & India, Organization & Structure of Health administration in India, Type of Health Organization including International Organizations, Private & Voluntary Health care provider, Distribution of Health Care Services, Health Care System in Public sector Organization, Health systems of Various Countries.

## **UNIT III: Health Policy and National Health Programme**

National Health Policy, Drug Policy, National Health Programs (Malaria, T.B., Blindness, AIDS etc.) Evaluation of Health Programs (Developing indicators for evaluation), Medical Education & Health Manpower Development.

## **UNIT IV: Health Economics – Fundamentals of Economics**

Scope & Coverage, Demand for Health Services, Health as an Investment, Population, health of Economic Development. Economics of Health-

Population based health services, Economics of Communicable and Non Communicable diseases

## **UNIT V: Methods & Techniques of Economic Evaluation of Health Program Cost**

### **Benefit & Cost Effective Methods**

- Household & Health

Health Expenditure & Outcome, Rationale for Government action, Household capacity, income and schooling

- Health Insurance.

## **MEDICAL SOCIOLOGY**

### **UNIT 1: NATURE AND SCOPE OF SOCIOLOGY**

Definition, Historical background, subject matter of sociology, Nature and scope, Importance, Sociology of India, Relationship of sociology with other social sciences

### **UNIT 2: FUNDAMENTAL CONCEPTS OF SOCIOLOGY**

Society and Individual, Community, Social structure and functions of Institutions, Association, Organization, Social system, social order, Social control, social groups, Social Process, Social change.

### **UNIT 3: CLASSICAL THINKERS AND THEIR CONTRIBUTIONS**

Auguste comte, Emile Durkheim, KarlMarx, Max Weber, Herbert Spencer

### **UNIT 4: SOCIOLOGY OF INDIA**

Characteristics of Indian society, Racial linguistic, Religious and demographic, Hindu social organization-ashramas, varnas, dharma and karma, purushartha, Caste system, Problems of SC&ST, Sanskritisation, Westernization and Modernization.

### **UNIT 5: ANTHROPOLOGY AND CULTURAL ANTHROPOLOGY**

Definition of anthropology, Subfield of anthropology, Cultural Anthropology yesterday and today, Anthropological Perspectives, Early Anthropologist  
33Environment and culture, Kinship, Clan Ethno methodology, Gender, Subsistence and Exchange, Social Organization and evolution of political system.

#### **Reference:**

- Bottomore.T.B., Sociology: A guide to problems and Literature,1971,Random House
- Gisbert P. Fundamentals of sociology,3rd Edition,2004,Orient Longman publications
- Neil J.Smelser,Handbook of sociology,1988.sage publication
- Johnson R.M,Systematic Introduction to Sociology,1960,Allied Publishers
- Cultural Anthropology,Barbara D.Miller,2006 Pearson/Allyn and Bacon Co
- C.N.ShankarRao., Introduction to Sociology, 2008, S.CHAND & Company Publications.
- . C.N.ShankarRao., Sociology of India, S.CHAND & Company Publications

**1. GENERAL BACTERIOLOGY, IMMUNOLOGY AND SYSTEMATIC BACTERIOLOGY**

**Course Objective**

This course will cover the following areas.

1. Basic principles of General Bacteriology and Immunology.
2. Fundamental knowledge about bacterial, viral, parasitic and fungal infections.
3. Techniques involved in diagnostic microbiology – preparation of media, sterilization and disinfections procedures, specimen collection, processing of clinical specimen, serological procedures etc.

**UNIT 1 : General bacteriology**

- Morphological classification of bacteria
- Bacterial cell structure – cell wall, cytoplasmic membrane, cytoplasm, flagella, fimbriae, nucleic acids, capsule, spore (diagram of bacterial cell structure)
- Definition of sterilization and disinfection, classification of physical and chemical methods of sterilization, autoclave, hot air oven filtration, chemical agents of sterilization – alcohol, aldehydes, halogens, phenol, gaseous method of sterilization, surface active agents, quality controls for sterilization procedures

**UNIT 2: Culture media & methods**

- Culture Media – Types – simple media, enriched media, enrichment media, selective media, indicator media, sugar media, transport media, anaerobic media (suitable examples)
- Culture methods – Aerobic culture method – streak culture, lawn culture, stroke culture, stab culture, inoculation in liquid culture, anaerobic culture media and methods Robertson's cooked meat media, thioglycollate medium, anaerobic jar
- Identification of bacteria – staining techniques – grams staining, acid fast staining. Biochemical reactions – sugar fermentation and IMViC tests. Antibiotic susceptibility testing – Kirby Bauer disc diffusion test

### UNIT 3: Immunology

- Sources and spread of infections
- Immunity – definition types of immunity with examples, vaccines, antibodies – types and functions
- Antigen antibody reactions – precipitation, agglutination, ELISA, immunochromatography.
- Hypersensitivity – definition, types, anaphylaxis

### UNIT 4: Systemic Bacteriology

- Staphylococcus, Streptococcus, - morphology, culture characteristics, Laboratory diagnosis
- Neisseria – Gonococcus and meningococcus – morphology, culture characteristics
- Gram negative bacilli – Escherichia coli, Klebsiella species, Proteus species, Pseudomonas species, Salmonella species, Shigella species, Vibrio species, Acinetobacter species – Morphology, cultural characteristics, laboratory diagnosis

### UNIT 5 :

- Mycobacterium tuberculosis – morphology, culture characteristics & Laboratory diagnosis
- Hospital acquired infections – definition, types, source and mode of spread of infection, hospital infection control
- Biomedical waste management – definition, segregation, management Universal precautions
- 

## **GENERAL BACTERIOLOGY, IMMUNOLOGY AND SYSTEMATIC BACTERIOLOGY**

### UNIT 1: General Bacteriology

- Microscope – Structure, operation, maintenance, types.
- Staining techniques – simple staining, Gram staining, Acid fast staining Detection of
- motility by hanging drop.

- Sterilization – Autoclave – Principle, working,

maintenance Hot air oven – Principle, working, maintenance

Chemical disinfectants – sodium hypochlorite, Iysoformin, phenols, gluteraldehyde, chlorhexidine/betadine (Povidine iodine)-uses

## **UNIT 2: Culture Media & Culture methods**

- Culture Media – Types – simple media, enriched media, enrichment media, selective media, indicator media, sugar media, transport media, anaerobic media – Preparation, sterilization and uses
- Culture methods – Aerobic and anaerobic culture methods – Techniques
- Identification of bacteria – biochemical reactions preparation and inoculation and interpretation
- Antibiotic susceptibility testing – Kirby Bauer disc diffusion test

UNIT 3:

## **Immunology**

- Serological tests – agglutination tests – Latex agglutination, tube agglutination
- Immunochromatography – Rapid card tests.
- ELISA (Enzyme linked immunosorbent assay)
- Mantoux test – Administration (type IV hypersensitivity)

UNIT 4:

## **Systemic Bacteriology**

- Staphylococcus, Streptococcus – Microscopy, colony morphology, identification
- Neisseria – Gonococcus and meningococcus – Microscopy
- Gram negative bacilli – Escherichia coli, Klebsiella species, Proteus species, Pseudomonas species, Salmonella species, Shigella species, Vibrio species – Microscopy, cologymorphology, Identification
- Mycobacterium tuberculosis – Microscopy, colony morphology, identification



## UNIT 5: Applied Microbiology

- Hospital acquired infections – definition, types, source and mode of spread of infection, hospital infection control – charts
- Biomedical waste management – spotter & charts
- Universal precautions – spotters & charts Drinking water analysis / Milk analysis
- Allergen testing

### Exam pattern (UE) Total marks – 60

1. Spotters & Charts – 10 (10x2=20)
2. Staining and culture techniques – 20
3. Serological techniques – 10
4. VIVA– 10

## **3. VIROLOGY, MYCOLOGY AND PARASITOLOGY – THEORY (UE)**

### UNIT 1 : General virology

- General properties of viruses – Basis structure of the virus, classification of viruses, viral multiplication
- Cultivation of viruses – Animal inoculation, embryonated eggs, tissue cultures
- Laboratory diagnosis of viral infections – Briefly on Microscopy detection of viral antigens and antibodies, isolation of virus, molecular diagnosis.
- Viral vaccines – Live and killed viral vaccine routinely administered

### Medically important viruses I

- Mode of transmission, clinical manifestations, and preventive measures.
  1. Herpes simplex viruses (HSV I & II)
  2. Influenza virus
  3. Polio virus
  4. Measles.

### UNIT 3: Medically important viruses II

- Mode of transmission, clinical manifestations, and preventive measures.
  1. Dengue
  2. Japanese B encephalitis
  3. Chikungunya
  4. Hepatitis
  5. HIV

### UNIT 4: Medically important fungi

- Morphology & infections caused by – Candida species, Dermatophytes, Aspergillus species, Mucor & Rhizopus.
- Culture media and staining methods used in identification of fungi

### UNIT 5:

### Medically important parasites

- Etiology, mode of transmission, sample to be collected – Ameobiasis, malaria, tape, worms, round worm, hook worm, filarial worm infections, pin worm, strongyloides & whip worm infections.

- Stool examination, Peripheral blood smear examination

### 4. VIROLOGY, MYCOLOGY AND PARASITOLOGY – PRACTICAL(UE)

- Sample collection-blood collection, serum separation, collection of otherrequired specimens
- Rapid card tests & ELISA for detection of antigens and antibodies
- Fungal media preparation and inoculation – Sabouraud's Dextrose Agar, Corn mealagar.
- Staining techniques – LPCB mount, KOH mount
- Stool concentration techniques, identification of ova cyst in stool samplesby saline andiodine mount,
- Peripheral blood smear – Preparation, Leishman's staining

### Exam pattern (UE) Total marks - 60

1. Spotters & Charts – 10 (10x2=20)
2. Staining and culture techniques – 20.

3. Serological techniques – 10
4. VIVA– 10

## **5. HOSPITAL PRODUCTS, PROMOTION, SALES AND PUBLIC RELATIONS**

### **UNIT I:**

- **An introduction to Marketing**

Role of marketing in Business management – Evolution and definition of marketing – Concepts of Marketing – Service vs. Products – Management of Service Management process

- **Services Marketing**

Classification of services – Characteristics of services and their marketing implication – Selecting appropriate tools for marketing.

### **UNIT II:**

- **Component of Service Marketing**

Product Planning, Market research system – Market segmentation – Targeting – Positioning – Launching new service – Concept of product life cycle, Pricing, setting the price – Economic Theory – Responding to price change, Physical Distribution, Major Aspects – Channels of distribution – Selection of channel, Promotion, Role of communication – Promotion mix – Advertising (Media – budget – Cost effectiveness – (attributing to hospitals a human face – Good will – image building among major public), Sales promotion (techniques – Evaluation), Direct selling (Sales force – Evaluation), Physical Environment, Process, People Unit III:

### **UNIT III:**

- **Analysing Markets and Buyer Behaviour**

Model of consumer behavior – Factors influencing buyer behavior – Buying decision process.

- **Branding of a Hospital Facility**

Brand name and concept - Positioning hospitals – Developing and USP – Brand image – Image building – long term and short term activities.

#### **UNIT IV:**

- **Other Marketing routes for Health Care Units**

Interpersonal communication – Print materials institutional marketing –seminars – conference.

- One case study related to Hospital Marketing

**OR**

#### **PHYSICIAN'S OFFICE MANAGEMENT**

##### **UNIT I. Outpatient Section**

Registration of new cases, Registration of repeat cases, Patient record guide, Laboratory X-Ray reports & reports & reports filing, Alpha index typing & Filing, O.P.

Records coding

(Disease & indexing), O.P. records retrieval, O.P. Statistics

##### **UNIT II. Inpatient Section**

Admitting office procedure, Inpatient record removal & forwarding, Ward Census,

##### **UNIT III. Assembling & deficiency checks, I.P. record coding & indexing,**

##### **UNIT IV. Discharge Analysis**

Incomplete record control, Completed record control, Medico legal procedures & issue of Medical Certification, Record retention & destruction of O.P. & I.P. records,

##### **UNIT V. Miscellaneous**

Hospital reception, Secretarial practice, Library (Medical)

## SEMESTER – VI

---

### 1. CLINICAL CHEMISTRY PAPER – I – THEORY (UE)

#### UNIT I

1. Role of a lab technician in Clinical Biochemistry lab.
2. Lab utensils: Beaker, Funnels, graduated cylinders, flasks, Volumetric flasks, Syringes, Pipettes, Micro pipettes, Multi – channel pipettes, Dilutors & dispensers. Quality control of micropipettes, Quality control validation for performance of pipettes.
3. Lab plastic & glass ware composition and cleaning.
4. Laboratory safety: Guidelines of OSHA, general safety (Fire, Electrical safety), Chemical Hygiene plan, Storage of chemicals, Labelling & Handling requirements, Waste generation & disposal

#### UNIT II : Units of measurement

Measurement of mass – basic quantities and units of SI. SI derived units used in medicine. Types of balances – maintenance of balance.

Basic calculations in Laboratory. Normality, Molality, Molarity, Dilutions – per cent concentration (wt/w, v/v, w/v), pH, pK, buffer preparation.

Water as reagent – Reagent grade water – purification process – Grade of water purity – storage & handling of reagent water – suggested uses of reagent water – Quality control – system documentation & record keeping

#### UNIT III : Instrumentation

**Centrifuges** – principles of centrifugation – centrifuge types, components, maintenance and quality assurance Water bath, Oven, Incubator – thermometer, calibration and maintenance

**Photometry** – principles of photometry. Components & applications of colorimeter. Spectrophotometer, Flame photometer, Nephelometer, turbidimetry & reflectance photometry

Enzymes definition, action, and kinetics

#### UNIT IV

Electrochemistry: Principles and measurements of electrochemistry & electro analytical chemistry. Potentiometry, Voltammetry coulometry methods – Principles, components, usage, advantages & disorders.

Electrophoresis – Principles, components, procedure, types, clinical application & interpretation of the data

## UNIT V

1. Chromatography – Principles, components, procedure, types, clinical application
2. Immunochemistry techniques – Principles of immunochemistry, detectors needed sensitivity & specificity – Elisa, Chemiluminescence, fluorescence assays.
3. Semi automatic, Automatic – Overview, Principles and methodologies used.

### **CLINICAL CHEMISTRY PAPER I – PRACTICAL**

**UNIT I – Pipetting & Weights and Measurements:** Principles of weighing, usage of pipettes, pipetting

Practice – principles of weight – preparation of solutions, Normality – molality – molarity – Dilution – percentage (V/V, W/V, V/W)

**UNIT II – pH and Buffers – Preparation of different buffers** – measurements of pH (pH paper, pH meter)

**UNIT III** – Standardisation of Biochemical substances – Glucose, Urea, Creatinine

**UNIT IV** – Estimation of Glucose, Urea, Creatinine, total protein, Albumin

### **UNIT V – Charts / Spotters / Case Studies**

1. Lab safety
2. Grading of reagent water
3. Conversion of Units
4. Calculation in Biochemistry
5. Waste generation & Disposal
6. PH
7. Buffer
8. Standardisation curve
9. Serum Protein Electrophoresis
10. Instrumentation – Identification

### 3. CLINICAL CHEMISTRY PAPER-II-THEORY (UE)

**UNIT I:** Pre – analytical – Blood Collection – Types of blood sample – Preservatives & anti-coagulants – Errors related to it Vacutainer system procedures to decrease phlebotomy related variables – Patient identification sample collection – Past collection cause – sample transportation – Procedure to minimize sample transportation errors – use of mechanical transporters – sample processing – procedures – Pre analytical variables in urine collections – pre-analytical variables in other body fluids – Blood collection for inborn errors of Metabolism – criteria for rejection of specimens

UNIT II: Analytical-

1. Overview of glucose homeostasis, Definition of Diabetes, overview of pathophysiology, Type I, II, GDM, Pre-Diabetes. Methodologies, comparison of methodologies, reference level. Diagnostic guidelines – Glucose, Insulin, C- Peptide, Glucose Tolerance test Determination, usage of HbA1C methodology to estimate.
2. Lipid Profile: Definition of lipid, Overview of types of lipid, distribution, their role in the body – Estimation of Total Cholesterol, triglycerides, HDL Cholesterol, LDL Cholesterol, VLDL Cholesterol – Methodology – Reference level – Diagnostic guidelines.
3. Liver Profile – Overview of Liver damage and the tests to identify it – total protein, Albumin, Bilirubin (Total & Direct), ALT, AST, ALP & GGT – Methodology – Reference level.
4. Renal Profile – Overview about Renal function, GFR, tubular function tests.
5. Minerals: Role of minerals in health – estimation of calcium, phosphorus, Magnesium, Iron, copper – Methodology – Reference level – interpretation of data.

**Vitamins:** Estimation of Folic acid, Vitamin B12, Vitamin D, Vitamin K, Vitamin B6 – methodology – Reference level – interpretation of data

UNIT III: Special Investigations: Hormones

Thyroid Gland Regulation, Test to Identify Thyroid disorder (T3, T4, FT3, FT4, TSH), Methodology and interpretation, Role of PTH in our Body, Tests to identify parathyroid disorder, PTH (free and Intact) Interpretation, Tests for Infertility LH, FSH, Prolactin, Estradiol, Testosterone (Free & total), B HCG interpretation, Methodologies existing, Hormone analysis

#### UNIT IV: Other Special Investigations

Tumour markers – Investigation for Myocardial Infraction – Investigation for acute Pancreatitis – Acid base abnormality – Anion Gap Nutritional assessment – Negative Nitrogen Balance – Positive Nitrogen Balance

#### UNIT V: Quality Control:

Sensitivity – Specificity – Linearity – Accuracy & Precision, Primary Standard, Secondary standard, Calibration – Internal Quality control indicators, External Quality Control Program, test utilization and turn around time, around time, Regulations for Lab (by Indian Govt Internatio: Guideliness). Hospital management structure – organisation of clinical lab, Communication within the total hospital, communication within the lab, Personal Management, Work Scheduling, Continuous Quality improvement – Continuing education – resource management (Lab staff, reagents, supplies& capital equipment).

### **4.** **CLINICAL CHEMISTRY PAPER II – PRACTICAL**

**UNIT I**-Estimation of Bilirubin, Cholesterol, Triglycerides, Uric Acid, Calcium,Phosphorus

**UNIT II**-Estimation of Enzymes amylase, Alkaline Phosphatases, Lipase

**Unit III**-Electrophoresis – Agar gel Electrophoresis – serum Protein Electrophoresis Identification and interpretation

**UNIT IV**-Chromatography – Circular paper chromatography – separation of Amino acids & Sugars and calculation of Rf values

**UNIT V**-Charts/Spotters/Case Studies

- Preservatives
- Anti-coagulants
- Types of Samples
- Vacutainers
- Blood Collection
- Reference interval
- Glucose Tolerance test graphs



- Interpretation of Routine tests
- QC materials
- Guideline for regulation of Lab

## **5.                                    TRAUMA LIFE & CARDIAC LIFE SUPPORT**

### **UNIT I. TRAUMA LIFE (Part 1)**

- BLS
- TRIAGE
  - a. Primary Survey
  - b. Secondary Survey
    - Airway & Ventilatory management
    - Shock
    - Central & peripheral venous access
    - Thoracic trauma – Tension pneumothorax
    - Other thoracic injuries
    - Abdominal trauma – Blunt injuries
    - Abdominal trauma – Penetrating injuries

### **II. TRAUMA LIFE (Part 2)**

- Spine and spinal cord trauma
- Head trauma
- Musculoskeletal trauma
- Electrical injuries
- Thermal burns
- Cold injury

### **UNIT III. TRAUMA LIFE (Part 3)**

- Paediatric trauma
- Trauma in pregnant women

- Workshop BLS
- Workshop cervical spine immobilization
- Imaging studies in trauma

#### **UNIT IV. CARDIAC LIFE SUPPORT (Part 1)**

- BLS
- The universal algorithm for adult ECC
- Ventricular fibrillation/Pulseless ventricular tachycardia algorithm
- Pulseless electrical activity (PEA) / asystole algorithm
- Bradycardia treatment algorithm
- Tachycardia Treatment

algorithm

#### **UNIT V. CARDIAC LIFE SUPPORT (Part 2)**

- Hypotension / Shock
- Acute myocardial infarction
- Paediatric Advanced life support
- Airway management
- Defibrillation
- Drugs used in ACLS
- SEmergency Cardiac pacing
- AED
- Techniques for oxygenation and ventilation

## **BIOSTATISTICS AND RESEARCH METHODOLOGY**

- **What is statistics** – Importance of statistics in behavioural sciences – Descriptive statistics and inferential statistics – Usefulness of quantification in behavioural sciences.
- **Measurements** – Scales of measurements – Nominal, Ordinal, Interval and Ratio scales.
- **Data collection** – Classification of data – Class intervals – Continuous and discrete measurements – Drawing frequency polygon – types of frequency polygon – Histogram.
- **Cumulative frequency curve** – Ogives – Drawing inference from graph.
- **Measures of central tendency** – Need – types: Mean, Median, Mode – Working out these measures with illustrations.
- **Measures of variability** – Need – Types: Range, Quartile deviation, Average deviation, Standard deviation, Variance – Interpretation.
- **Normal distribution** – General properties of normal distribution – Theory of probability – Illustration of normal distribution – area under the normal probability curve.
- **Variants from the normal distribution** – skewness – Quantitative measurement of skewness – kurtosis – measurement of kurtosis – factors contributing for non-normal distribution.
- **Correlation** – historical contribution – meaning of correlation – types: Product, moment, content correlation, variation of product, movement correlation, rank correlation, Regression analysis.
- **Tests of significance**- need for – significance of the mean – sampling error – significance of differences between means – interpretation of probability levels – small samples – large samples.

## **VII & VIII SEMESTER**

**1. Project &**

**Dissertation**

**2. Postings During**

**Internship**

- ❖ **BLOOD COLLECTION AREA**
- ❖ **BIOCHEMISTRY LAB**
- ❖ **MICROBIOLOGY LAB**
- ❖ **HISTOPATHOLOGY LAB**
- ❖ **CYTOLOGY LAB**
- ❖ **BLOOD BANKING**
- ❖ **PATHOLOGY SPECIMENS SECTION AREA**